We claim:

1. A monitoring system for an ACR unit comprising:

a microprocessor;

a plurality of inputs operatively connected to said microprocessor and adapted to receive data from a plurality of sensors operatively connected to the ACR unit;

a memory operatively connected to said microprocessor storing data describing a pressure enthalpy diagram for at least one refrigerant and a nominal pressure enthalpy path for the ACR unit; and

a display;

wherein said microprocessor uses data received at said inputs for calculating an actual pressure enthalpy path for the ACR unit.

2. The monitoring system of claim 1 wherein said microprocessor causes the nominal pressure enthalpy path for the ACR unit to be shown on said display.

3. The monitoring system of claim 1 wherein said microprocessor causes the actual pressure enthalpy path for the ACR unit to be shown on said display.

4. The monitoring system of claim 1 wherein said microprocessor causes the nominal pressure enthalpy path for the ACR unit and the actual pressure enthalpy path for the ACR unit to be shown concurrently on said display.

5. The monitoring system of claim 4 wherein said microprocessor calculates from said data at least one other characteristic of the ACR unit, said ACR unit comprising a compressor, a condenser and an evaporator, wherein said at least one other characteristic is selected from the group consisting of: refrigerant effect, amount of heat rejected to the condenser, compressor work performed, degree of refrigerant superheating, degree of

refrigerant sub-cooling, percentage of flash gasses, coefficient of performance, and pressure drop in a system line.

6. The monitoring system of claim 1 including an artificial neural network connected to said microprocessor.

7. A method of measuring the performance of an ACR unit containing a refrigerant comprising the steps of:

measuring a plurality of characteristics of the ACR unit including refrigerant temperature at a first location and refrigerant pressure at a second location;

calculating a pressure enthalpy path for the ACR unit based on the measured characteristics; and

graphically displaying a pressure enthalpy curve for the refrigerant and the calculated pressure enthalpy path of the unit.

8. The method of claim 7 including the additional step of displaying a nominal pressure enthalpy path for the ACR unit.

9. The method of claim 8 including the additional step of displaying a nominal pressure enthalpy path for the ACR unit concurrently with the calculated pressure enthalpy curve.

10. The method of claim 8 including the additional step calculating at least one additional characteristic of the ACR unit, wherein the ACR unit comprises a compressor, a condenser and an evaporator, the at least one additional characteristic selected from the group consisting of: refrigerant effect, amount of heat rejected to the condenser, compressor work performed, degree of refrigerant superheating, degree of refrigerant sub-cooling, percentage of flash gasses, coefficient of performance, and pressure drop in

a system line.

11. The method of claim 10 including the additional step of determining the operational status of the ACR unit.

12. The method of claim 11 including the additional step of diagnosing potential malfunctions of the ACR unit before they occur.

13. A portable monitoring system for an ACR unit comprising a compressor, a condenser and an evaporator, the system comprising:

a microprocessor having a plurality of data inputs;

a plurality of sensors connected to the ACR unit and operatively connected to said plurality of data inputs;

a memory operatively connected to said microprocessor storing data describing a pressure enthalpy diagram for at least one refrigerant and a nominal pressure enthalpy path for the ACR unit;

an artificial neural network connected to said microprocessor; and

a display;

wherein said microprocessor uses data received at said data inputs for calculating an actual pressure enthalpy path for the ACR unit and causes the nominal pressure enthalpy path for the ACR unit and the actual pressure enthalpy path for the ACR unit to be shown concurrently on said display, and wherein the said microprocessor calculates from said data at least one additional characteristic of the ACR unit selected from the group consisting of: refrigerant effect, amount of heat rejected to the condenser, compressor work performed, degree of refrigerant superheating, degree of refrigerant sub-cooling, percentage of flash gasses, coefficient of performance, and pressure drop in

a system line.

14. A monitoring system for an ACR unit comprising:

microprocessor means including memory means;

means for obtaining values of a plurality of characteristics of the ACR unit operatively connected to said microprocessor means;

data describing a pressure enthalpy diagram for a refrigerant and a nominal pressure enthalpy path for the ACR unit stored in said memory means; and

means for graphically displaying a pressure enthalpy path;

wherein said microprocessor means calculates from the values a description of an actual pressure enthalpy path for the ACR unit and causes the nominal pressure enthalpy path and the actual pressure enthalpy path for the ACR unit to be displayed on the means for graphically displaying a pressure enthalpy path.

15. The monitoring system of claim 14 including diagnosing means for diagnosing a malfunction of the ACR unit.

16. The monitoring system of claim 14 including predicting means for predicting a malfunction of the ACR unit before a malfunction occurs.